ALTERNATIVES TO DEMOLITION

Opportunities to Reduce Solid Waste through Deconstruction:
Reuse & Recycling of Building Materials

MD P2 Partnership
7 May 2003

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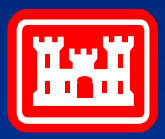

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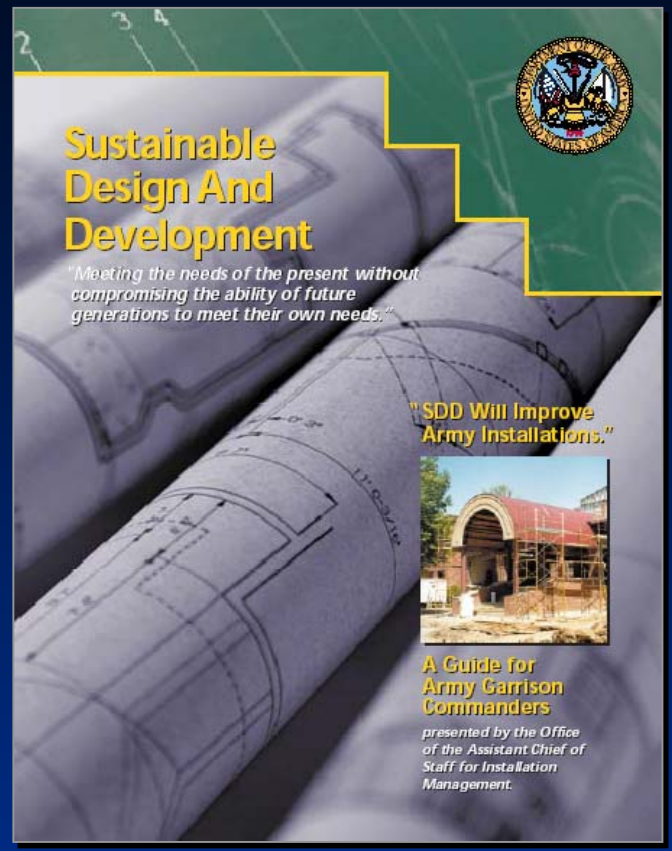
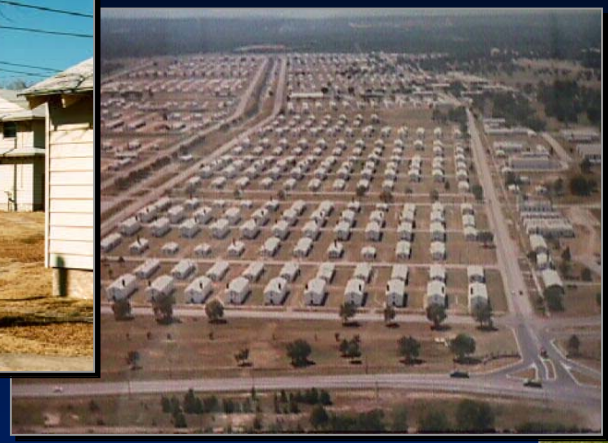
"SUSTAINABLE DESIGN & DEVELOPMENT"

- **We know the drill …**
  - *EO 13101 "Greening of the Government …"*
  - *PDASA (I&E) Memorandum "Deconstruction and Re-Use of Excess Army Buildings"*
  - *DoD P2 Measure of Merit*
  - *SPiRiT*
  - *ACSIM Guidance*
  - *Others*



EXCESS ARMY FACILITIES: CURRENT PROBLEM



- Need to dispose of about 50 Million ft^2 of surplus WWII-era building
- Roughly 3x that amount, total requirement

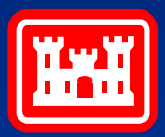
Current Problem

- **As a liability:**
  - *Building debris: ~100 ton / 500 yd^3*
  - *Concrete debris: ~200 ton / 200 yd^3*
  - *Demolition cost: $25,000 +*
  - *Life Cycle landfill cost: ~ $15,000*
  - *Landfill expansion is problematic*
  - *Off-site disposal: $30-90/ton*

"DECONSTRUCTION"

- Dismantling a building in the reverse order of construction
- ...for the purposes of maximum reuse and recycling of materials
- ...in a cost-effective and safe manner

But why even consider DECONSTRUCTION?



Deconstruction

- **As a potential resource:**
  - *Framing Lumber: ~ 20,000 BF (board-ft)*
  - *Sheathing ~5,000 ft²*
  - *Siding: ~5,000 ft²*
  - *Ext. doors: 6 Ea*
  - *Windows: 40 Ea*
  - *… Others*

ARMY EXAMPLES

- **Fort McCoy, WI**
  - *Advertised to general public*
  - *140+ buildings since 1992*
    - *$3.5 Million savings*
    - *Recycles concrete on-post*

- **Fort Knox, KY**
  - *Auctions recycle rights*
  - *258 buildings over 37 mo.*
    - *~78,468 tons debris diverted*
    - *~$641,114 savings in demo*
    - *~$256,085 income generated*

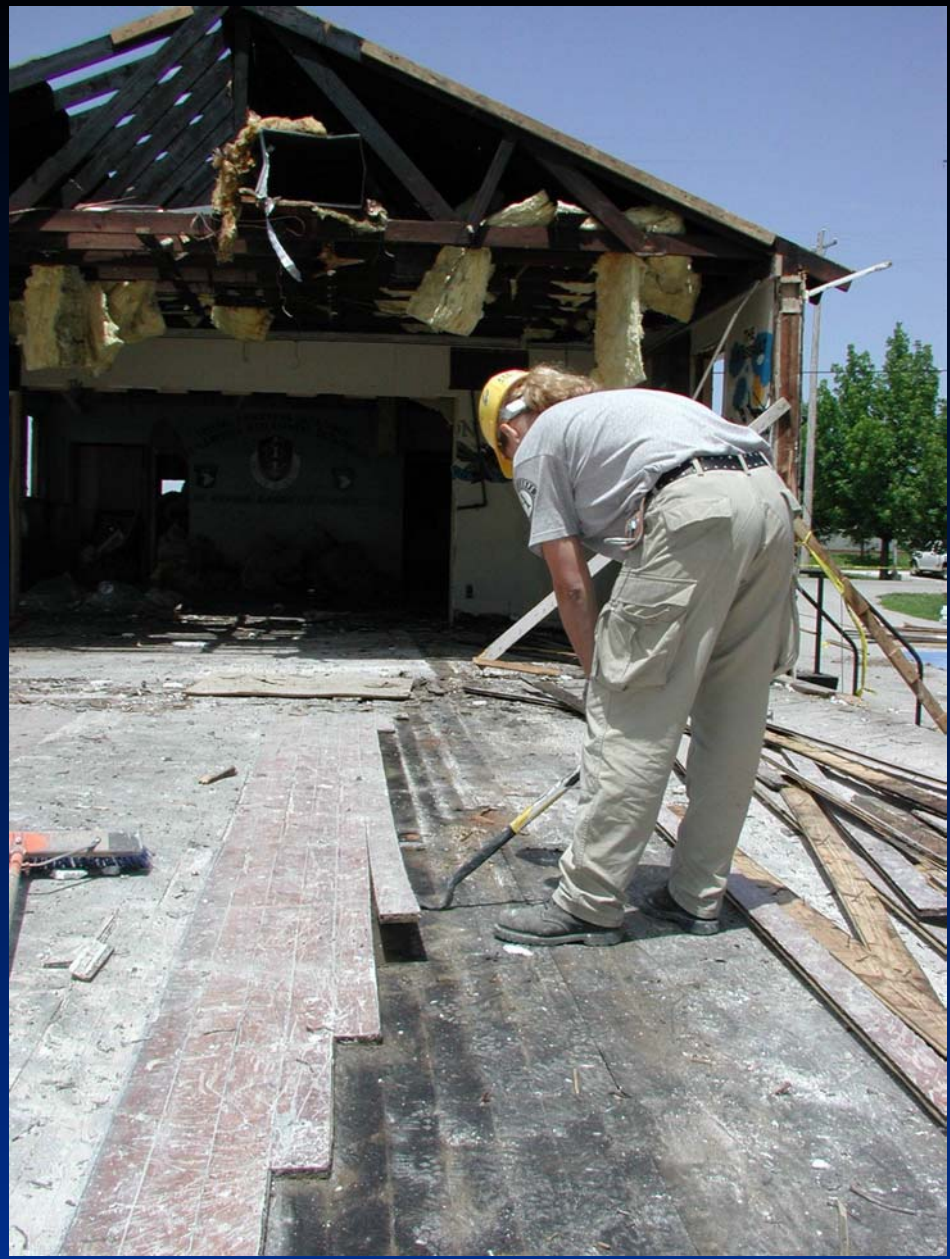
FORT CAMPBELL PILOT DECONSTRUCTION

- **5 Buildings, ~22,000 ft² Total Scope**
  - *Administrative, Barracks, Warehouse*
  - *Partnership among CERL, USEPA, Fort Campbell PWBC, HfH, AmeriCorps, University of Florida CCE, US Forest Products Laboratory*


2002. 5. 7


2002. 5. 9


2002. 5. 10



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STAFF

Ft. Campbell Pilot

- **Salvaged for resale**
  - *98 Windows*
  - *23 Personnel Doors*
  - *136 Roof Trusses*
  - *14,300 ft² T&G Wood Flooring (Oak & Pine)*
  - *107,000 BF Lumber*
  - *8 Furnaces / heaters*
  - *Misc. plumbing & electrical components*
  - *>5 Tons scrap metal*
  - *Others*

  ….$41,000 resale value

A Non-Army Example

- **Gates Residence, Medina, WA**
  - *"Price is no object"*

DISPOSAL OF LEAD-BASED PAINTED BUILDING MATERIALS AT FORT ORD

- Apply reactive coating to reduce solubility / leachability of lead
- Coated materials will pass Federal TCLP for lead
- Segregate debris
  - *Recycle "clean" debris*
  - *Thermal process LBP materials*


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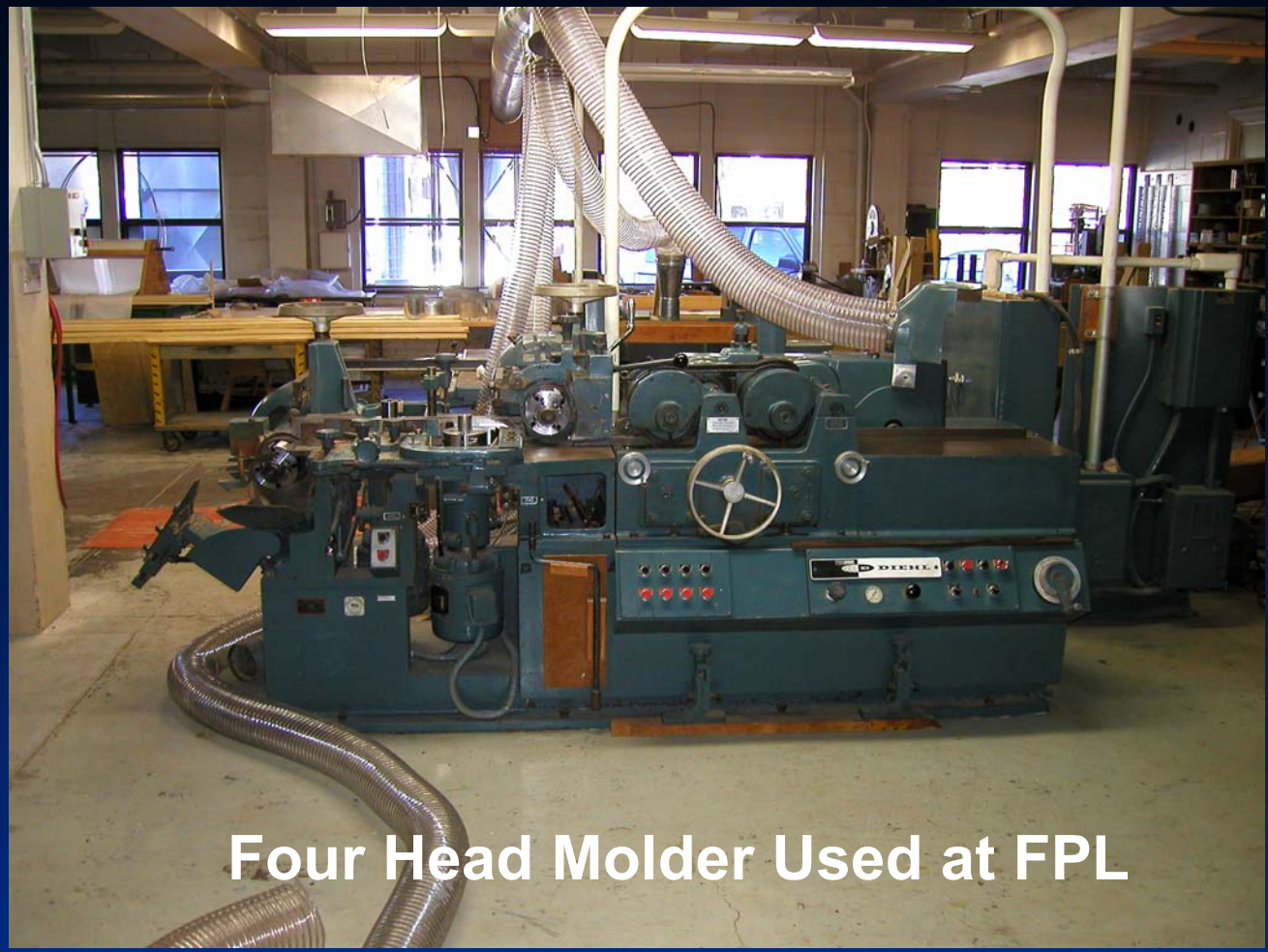
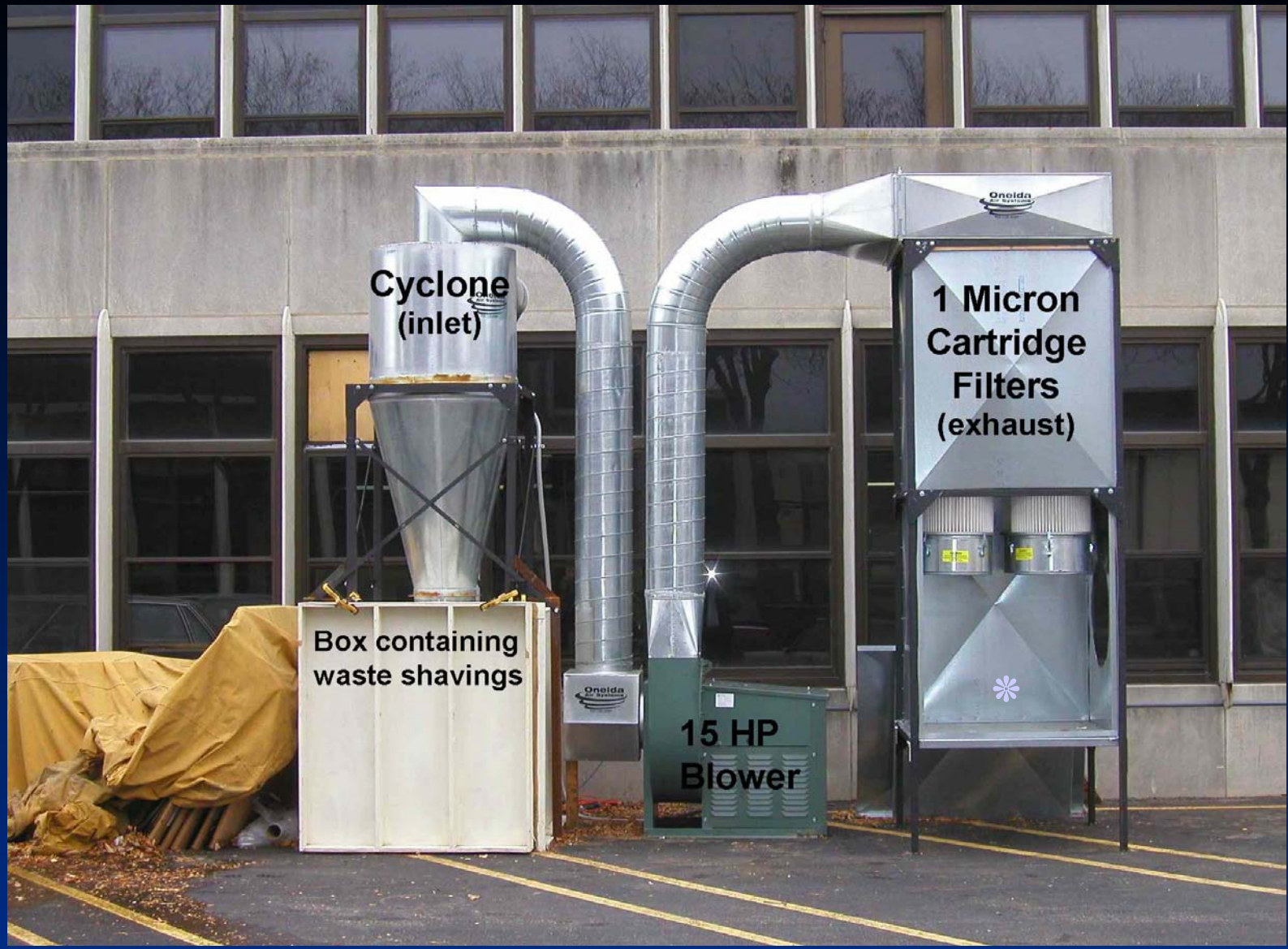
RECOVERY OF LBP-COATED WOOD

- **Painted wood can be re-milled to produce high value products**
  - *Siding materials are higher quality wood products*
  - *Applicable with manual deconstruction*
  - *LBP waste is concentrated in small volume of wood waste*

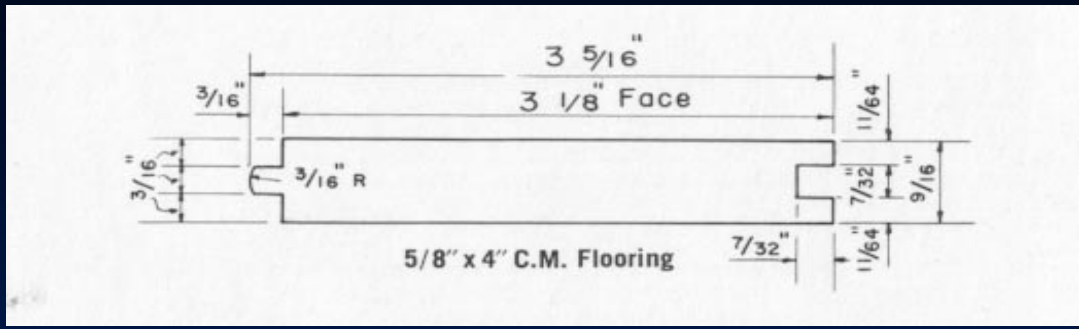
Fort Ord Siding

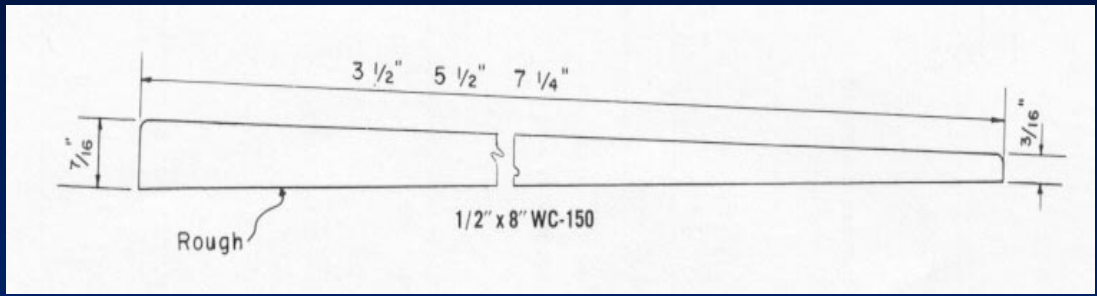


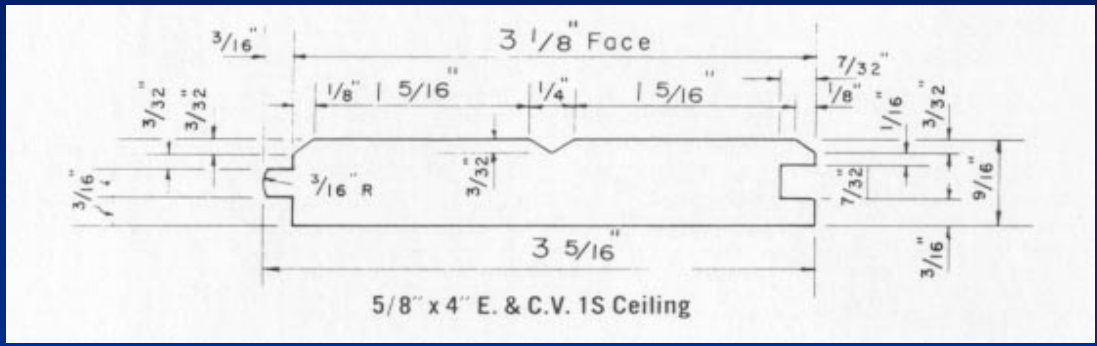
Four Head Molder Used at FPL


Cyclone
(inlet)
1 Micron
Cartridge
Filters
(exhaust)
Box containing
waste shavings
15 HP
Blower

Products Evaluated at FPL







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Value of Siding for Flooring

- Antique T&G flooring (nominal 3” width)
  - *Typical pricing: $3 - $11/ ft²*
    - *Higher value for vertical grain (VG)*
  - *Higher value for nail holes!*
  - *4 linear feet equals 1 ft²*
- Retail value from each building at least $2,500 (based on $4 / *ft²*)

RECYCLING CONCRETE FROM BUILDINGS

- Research environmental issues
- Define applications for recycled aggregate products
- Develop cost & schedule data
- Develop guidance & resources

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Lead (Pb) in Concrete

- Joint case study at Fort Ord (FHU) - CERL, CMRA, NADC
- Model Pb concentrations from building to crushed concrete product
- Compare to (or derive) environmental standards

WHAT WE'RE DOING NOW

- **Recycling Concrete from Building (process and LBP issues)** *(RDTE)*
- **Public Works Tech. Bulletins** *(CEMP-IS / CESWT-PM)*
- **Deconstruction Demo at Fort McClellan** *(UFL, DoD/EPA P2) April 2003*
- **Deconstruction / Material Recovery Demo at Camp Roberts, CA** *(ESTCP)*
- **Feasibility of Deconstruction at Badger AAP** *(USFPL)*
- **Disposal of LBP Building Materials & Recovery of LBP Coated Wood** *(Congressional)*

WHAT WE'RE ABLE TO DO

- Cost analyses
- Industry / partnering
- Deconstruction project development
- Environmental assistance
- Project documentation / analyses
- Data / guidance
- …. Other

QUESTIONS / COMMENTS?

Websites for More Info

- <http://www.hnd.usace.army.mil/techinfo/CPW/pwtb.htm>
  - *Public Works Technical Bulletins*
- http://buildingdeconstruction.org + email list
  - *Deconstruction Research Consortium*
- https://www.denix.osd.mil/aswr + email list
  - *Army Solid Waste and Recycling*
- http://www.cecer.army.mil/SustDesign/Index.cfm
  - *CERL Sustainable Design (incl. SPiRiT)*

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